INGUINO-PROPERITONEAL HERNIA; INGUINO-INTERSTITIAL HERNIA.

REPORT OF CASES WITH REMARKS.[1]

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CASE I.—*Strangulated Inguino-properitoneal Hernia; Reduction en masse; Herniotomy; Recovery.*—F. M., male; aged 52; admitted to the St. Luke's Hospital January 18, 1904. History: The patient has had a right inguinal hernia for six years past. He first noticed it after lifting a heavy timber. It has gradually grown until at the present time it is larger than two fists. Shortly after its development he had a truss fitted by his family physician, which has been quite satisfactory. It has retained the hernia excepting when he was obliged to lift unusual weights. At these times when the hernia came down he could by manipulation effect its reduction without difficulty. Two days ago the hernia slipped by the truss while he was loading wood upon a sleigh and was allowed to remain down about an hour before an attempt was made to replace it. When an effort was made to reduce the hernia it failed. The pain was moderately severe, but not sufficient to prevent his finishing his day's work. After returning home in the evening, another unsuccessful attempt was made to reduce the hernia. The pain had now become quite severe and was accompanied by nausea. About 10 o'clock at night he vomited once. After this he became alarmed and sent for his family physician, who administered a hypodermic of morphine and applied hot fomentations to the hernia. After an hour the hernia was reduced. At the time he noticed that the swelling did not disappear suddenly as it had on former occasions when the gut slipped back into the abdomen. The pain was lessened but did not subside completely. The large tumor had disappeared, but he could still feel a small mass in the inguinal region which was exceedingly sensitive to touch. The nausea continued all through the night, but he did not vomit again. There was no bowel movement after the hernia came down, neither did any gas escape. The following morning the symptoms remaining the same he was brought to the hospital.

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Physical Examination on admission to the hospital showed the heart and lungs negative. The pulse was slightly accelerated and the temperature was 99° F. The abdomen was moderately distended, but not tender. There was no marked rigidity of the abdominal muscles. Over the middle third of Poupart's ligament on the right side there was a tumor about the size of an English walnut, rather firm, immovable, and tender on pressure. The inguinal canal was empty, admitting the index-finger freely. With the finger in the inguinal canal, the tumor could be felt above and to the inner side of the internal abdominal ring, in the abdominal wall. The scrotum contained the testicles, which were normal in size and appearance.

The subjective symptoms were about as they had been since the accident occurred. There was some pain in the inguinal regions, which he claims is as intense as it was immediately after the hernia was reduced. The bowels have not moved and no gas has been passed. With these symptoms continuing, an operation was advised, it being considered probable that a complete reduction had not been accomplished. The existence of a properitoneal sac was not recognized.

After the usual preparation, the operation for herniotomy was begun. After exposing the external abdominal ring a sac was found extending from the ring down into the scrotum. This was freed from its attachments up to the external ring. The inguinal canal was opened by incising the aponeurosis of the external oblique. After freeing the inguinal sac up to the internal ring it was opened, and from it escaped a small quantity of bloody serum. On pulling down on the inguinal sac, the neck of a second sac was brought into view. This sac was opened by extending the incision made in the first sac. It was seen to contain a small knuckle of the small intestine and a piece of omentum. The omentum was dark in color and œdematous. It was freed from the sac, drawn out beyond its point of constriction, ligated and cut off. The stump was pushed back into the abdomen. With the replacement of the omentum, the knuckle of gut was freed and dropped back into the abdominal cavity. The second sac was now dissected from its attachments and found to occupy a cavity between the peritoneum and the transversalis fascia. The cavity containing it was above and to the inner side of the inguinal canal. After pulling out the sac from its place in the abdominal wall, it was found to open by a common orifice with the first sac into the abdominal cavity. This orifice, which would barely admit the index-finger, was constricted and surrounded by a dense band of fibrous tissue. In size, the deep sac was not as great in circumference and only about one-third the length of the inguinal sac. It admitted freely the thumb up to the base of the first phalanx.

After carefully studying the relations of the two sacs to each other and to the abdominal wall, the common orifice was enlarged to admit two fingers into the abdominal cavity. The strangulated loop of gut was searched for and brought into the opening. The part constricted was found to be a portion of the convex border of the gut opposite the mesentery; only a segment of the circumference of the gut was strangulated. Although the intestinal wall was discolored, yet the circulation seemed to be undisturbed and its surface still showed its normal gloss. It was deemed safe to replace it in the abdomen. The two sacs were then pulled forward until a funnel-shaped process of peritoneum, their common neck, was brought into view. This was incised beyond the abdominal orifice of the sacs and the resulting opening in the peritoneum closed by suture. The operation for the radical cure of the hernia was completed, Andrew's modification of the Bassini method being employed.

The wound healed by primary union; recovery with cure of the hernia resulted. The patient was discharged February 6, 1904.

The term "inguino-properitoneal" hernia is reserved for those which fulfil the following conditions: (1) There must be two sacs or two divisions of one sac. (2) The inner or intraparietal sac lies between the peritoneum and the transversalis fascia. (3) The outer or inguinal sac occupies the inguinal canal or extends down into the scrotum for a variable distance depending upon the degree of completeness attained by the hernia. (4) The origin of the two sacs is by a common funnel-like process. They open into the abdominal cavity by a common orifice.

Although Parise[1] first described this variety of hernia, it was Krönlein[2] who first gave it the name of properitoneal hernia, and described fully its anatomical and clinical peculiarities. Since Krönlein's work appeared, a large number of cases have been reported with but few new facts added to what he had observed. In 1895 Breiter[3] was able to find the reports of 36 cases of which no question could be raised as to their place in this group. These, added to Krönlein's 23 cases, made 59, that had been reported up to that year. The works of Krönlein and Breiter have been supplemented by papers from Faghet[4] in France, Moynihan[5] in England, and Schmidt[6] in Germany.

Etiology.—It has been observed that properitoneal hernia is frequently associated with imperfect descent or development of the testicles. Many writers assume from this the existence of a causal relation between the arrest of descent of the testicle and the formation of a properitoneal sac. Undoubtedly, given a case in which the ectopic testicle is placed in the inguinal canal or just below the external ring, associated with a congenital hernia, that, impulses from above continuing while the descent of the gut in the inguinal sac is impeded by the misplaced testicle, the gut will be forced laterally in the direction of the least resistance, which may be the cause of a diverticulum of the sac being forced into the loose cellular tissue between the peritoneum and the transversalis fascia. On the other hand it is well known that many cases of properitoneal hernia have been reported in males in which the testicles, fully developed, have reached their normal position in the scrotum. In a few cases reported, this variety of hernia has been found in the female. Eccles claims that, taking all the reported cases, they are relatively more common in the female than in the male sex.

Considering further the etiology of properitoneal hernia, we may have the return of the bowel from the inguinal sac impeded by a cicatricial narrowing of the neck of the inguinal sac, thus causing a bulging of the neck of the sac between the layers of the abdominal wall.

Repeated and unrestrained efforts at reduction of a hernia made by the patient may be a cause of the development of the properitoneal sac which is secondary to an existing inguinal sac. Obstruction of the inguinal canal other than from a misplaced testicle may assist in forming a second sac. This may be from a congenitally small external ring with an unusually large canal. Cicatricial narrowing of the external ring resulting from a trauma, or the pressure of a misfitted truss which closes the external ring and not the canal, may be factors in establishing a secondary properitoneal sac. Eppinger believes them to be all congenital, the inner sac developing from a diverticulum of the funicular process between its point of origin and the internal ring, which is usually constricted. Schmidt accounts for the internal sac by assuming the existence of a dislocated internal ring. As a result of this dislocation, the normal descent of the testicle is interfered with and an inner sac is formed from the upper portion of the inguinal process. Congenital diverticular pouches located about the inner ring as first observed by Rokitansky may constitute a starting-point for the formation of a properitoneal sac. Moynihan has observed them in adults, but more often in the fetus.

Reduction *en masse* has been considered as a cause of properitoneal hernia. The phenomenon known as mass reduction has been frequently observed in those hernias in which a bilocular sac existed. It is probable that in a large proportion of cases in which this accident has occurred, there existed previous to the reduction a second sac into which the contents of the inguinal sac had been frequently forced. Strangulation after one of these apparent reductions continues from constriction of the common abdominal orifice of the two sacs.

At the operation or at the autopsy the presence of a properitoneal sac may be first discovered. The generally-accepted explanation of the so-called reduction *en masse* is that an inguinal or crural sac, by repeated and forcible manipulation, is separated from its attachments to the surrounding structures and invaginated, or is pushed into the abdominal cavity without the relations existing between the sac and its contents being changed by the change in position of the sac. It may be here stated that such a separation of the sac, particularly of a congenital hernia, would seem impossible. The difficulty mentioned in separating an acquired hernial sac from its attachments in herniotomy, which in most operations is considerable, would seem to preclude the possibility of this occurring from taxis applied through the intact coverings of a hernia. Strubel[7] believes this usual explanation of reduction *en masse* of a hernia to be unsupported by autopsy, and considers that it occurs only in bilocular hernia of some variety. Other accidents that may simulate reduction *en masse,* but which cannot be strictly so considered, are rupture of the sac with the escape of the hernia into a pocket in the abdominal wall, or rupture of a sac containing a large quantity of hernial fluid with the escape of the fluid into the abdominal cavity or between the muscles of the abdominal wall, the gut or omentum remaining strangulated. This occurring in a fat patient where the wall is thick and hernia small, the presence of a strangulated piece of intestine in sac might be overlooked. The diminution in size of the tumor might be considered evidence of complete reduction of the hernia.

In summing up the factors that appear to us as being the most important in the causation of properitoneal hernia, and also of the other forms of interstitial hernia, we may mention that there appears to be good reason to believe that congenital defects such as incomplete descent of the testicle, congenitally misplaced internal abdominal ring, unusual narrowing of the external ring, or congenital diverticular-like process of the peritoneum about the internal ring, may determine the development of a secondary interstitial sac, the inguinal sac being primary in time of development. It has been shown that bilocular hernia occurs more frequently on the right side than on the left (33 in right and 20 in the left in 59 cases collected by Breiter). It is also well known that ectopic testes occur oftener in the right side, and that the funicular process closes later on the right than on the left side. These facts indicate that some relation may exist between these congenital defects and the occurrence of a properitoneal hernia. However, the existence of this variety of hernia without the congenital defects mentioned above indicates that the other etiologic factors detailed may occasionally determine the development of a second sac. The chief we believe to be the use of a poorly fitted truss.

Relation of the Properitoneal Sac to the Internal Ring.—The inner or properitóneal sac generally occupies one of three positions: (1) Between the internal ring and the anterior superior iliac spine, its long axis being directed upwards and outwards parallel with Poupart's ligament. This is the usual position and easiest recognized before the sac is exposed either by operation or autopsy. (2) It may be directed downwards and inwards to the side of or in front of the bladder. This form has been described as hernia inguinalis ante-vesicalis. (3) It may be directed backwards and occupy the inner part of the iliac fossa. In this variety the inner sac lies close to the retroperitoneal pouches that are known as the subcæcal fossæ. Moynihan believes that certain cases described as hernia into the retrocæcal fossæ have in reality been properitoneal hernia belonging to this third group. U. Schmidt[8] describes an inguinal-properitoneal hernia in which the properitoneal sac extended from the internal ring to the obturator foramen, occupying a part of the true pelvic cavity. The patient had what was considered a common left inguinal hernia that had existed for several years. Twice it had become strangulated. The first time reduction, which was easily made without an anæsthetic, was complete. A few months later it again became irreducible and painful. An attempt at reduction was made and considered successful. The symptoms of strangulation continued. Operation upon the second day after the apparent reduction showed the inguinal sac to contain only about 30 c.c. of bloody fluid. As the cause of the persisting symptoms of strangulation could not be discovered through the herniotomy wound the abdomen was opened in the median line. With the patient in the Trendelenburg position a careful search revealed the properitoneal sac deep in the pelvis. An opening connecting with the inguinal sac that just admitted the index-finger was located. The strangulation occurred at the neck of the properitoneal sac.

The size of the properitoneal sac is usually small, and in this respect bears no relation to the inguinal sac. Many of the reported cases were described as Littre's hernia, the properitoneal sac containing only a small diverticular-like segment of the circumference of the gut. This was the condition found in our case.

The inguinal sac may occupy any part of the inguinal canal or extend into the scrotum. It is frequently congenital, and at times double. In itself it differs in no particular from the sac of an ordinary inguinal hernia. The common abdominal orifice of the two sacs is frequently contracted. Its margin may be rigid from the presence of cicatricial tissue, due no doubt to repeated traumatism from the forcible reduction of the hernia.

The diagnosis of Properitoneal Hernia is seldom made excepting when the properitoneal sac is exposed to view during an operation or at the autopsy. Braun[9] reported what he believed to be the first case in which the presence of a properitoneal sac was recognized and the exact anatomic condition detailed before the patient was operated upon for the relief of the strangulation which existed.

The usual history of these cases is that a patient with an inguinal or femoral hernia which has been hitherto reducible, suddenly develops symptoms of subacute or acute strangulation. Reduction by taxis is attempted and followed by apparent success. The pain, obstipation and other symptoms of strangulation persist, with a fatal termination unless relieved by operation.

The presence of the properitoneal sac when filled with gut or omentum can be recognized in some cases. In those in which the sac is directed upwards and outwards, the presence of a tumor or tumefaction makes it possible to map it out.

When the sac is directed downwards and inwards toward the bladder, or when it is directed backwards in the pelvis, its deep location precludes the possibility of its recognition by palpation or percussion. In Breiter's collection of 36 cases, it was possible in 22 to recognize a tumor which was proved either by autopsy or operation to be the properitoneal sac.

Moynihan believes these figures to be incorrect, and supports his argument by the examination of specimens found in the museum of the London Hospital. These show that in the majority of cases the direction of the sac is such that it could not possibly be recognized by means of physical examination during life.

Strangulation of the properitoneal (or of any variety of bilocular) hernia may happen in one of three places. (1) It may occur in the common orifice of the two sacs. If the hernia appears to have been reduced, it means that the contents of the inguinal sac have been pushed into the deep sac without affecting in any way the part strangulated. If the sac occupies a position which will permit of its being recognized by palpation, the persistence of the symptoms of strangulation are easily explained. The absence of a tumor indicating the presence of a properitoneal sac should not however deter a surgeon from operating in cases of apparent reduction in which the symptoms of strangulation continue. The case of Schmidt, detailed above, demonstrates the great necessity of making a careful search of the hernia region for the properitoneal sac.

(2) Strangulation may take place at the neck of the properitoneal sac. If there is no external evidence of the

existence of this sac, the case will pass for one of intestinal obstruction. The cause will only be revealed after the abdomen has been opened. In all cases of obstruction when there is a reducible hernia, the possibility of a second interstitial sac lodging a loop of gut should be considered.

(3) If the constriction occurs at the neck of the inguinal sac, the case is one of ordinary strangulated hernia. The properitoneal sac may be overlooked even in cases submitted to operation.

CASE II.—*Left Inguino-interstitial Hernia (Hernia Inguino-Subfascialis); Herniotomy; Recovery.*—Adolph K., aged 65, entered the St. Luke's Hospital, July 3, 1905. History: Patient has had a large left inguinal hernia for about thirty years. He states that he has worn a truss for fifteen years and that during the last five years it has failed to retain the hernia completely. Examination while the patient is standing shows that the hernia reaches the bottom of the scrotum and is larger than two fists. The external inguinal ring and the inguinal canal are very large, admitting readily two fingers. There is marked impulse on coughing. When erect, the tumor reaches from the bottom of the scrotum upwards and outwards near the anterior superior iliac spine. When reclining the scrotal enlargement nearly disappears. The tumor between the external ring and the anterior superior spine does not disappear, but becomes less prominent. If an effort to rise is made when the patient is reclining, the inguinal tumor becomes very prominent and its walls quite tense. On percussion it has a uniform tympanitic note. Compression of this tumor causes diminution in size but not complete disappearance.

Both testicles are in the scrotum; both are normal in size, position and consistency. The patient complains principally of a feeling of dragging and weight in the abdomen, and has entered the hospital for the purpose of securing relief through operation.

Operation on July 7, 1905, under Ether Anæsthesia.—The usual incision employed in herniotomy was made, exposing the external inguinal ring and the cord. A hernial sac was found extending from the external ring down into the scrotum. The relation of the testicle and cord to the sac showed that the sac was acquired and not congenital. After freeing the sac from its attachments up to the external ring, it was opened and found empty. The aponeurosis of the external oblique was then incised from the external to the internal ring, exposing the neck of a second sac. Further division of the external oblique showed this second sac to be about 3½ inches in length and connected with the first or inguinal sac, both sacs opening into the abdominal cavity by a common orifice which admitted two fingers. The second sac lay underneath the aponeurosis of the external oblique resting upon the internal oblique. When opened it contained a loop of intestine about six inches in length which was not adherent and which was readily replaced into the abdomen. The two sacs were drawn outwards, the common neck loosened from the internal ring, a purse-string suture was passed around it and the sacs removed by cutting through this neck. The abdominal cavity was closed by tightening the purse-string suture. The operation was completed by Bassini's method for radical cure of hernia. Healing by primary union, with cure of the hernia.

This case represents the commonest form of interstitial hernia. The classification of these herniæ is based upon the position occupied by the interparietal sac. Any hernia in which a portion of the sac is placed in the planus of the abdominal wall is called interstitial or interparietal. Taking this definition we find clinically that the inner sac has been found: (1) Between the peritoneum and transversalis fascia—the so-called properitoneal hernia, which represents the rarest type of interstitial hernia. (2) Between the internal oblique and the aponeurosis of the external oblique muscles. This is the most common form and was first described by Goyrand [10] and called by him Hernia Inguino-Interstitialis. It is also termed Hernia Inguino-Subfascialis by Strubel. (3) The parietal sac may lie between the skin and the external oblique. This variety was first described by Kuster [11] and termed Hernia Inguino-Superficialis. In this type the superficial sac may pass upwards toward the anterior superior spine of the ilium or may reach downward onto the thigh as in Busch's [12] case. In Brocas's [13] case it extended upwards and inwards toward the umbilicus. In other cases the sac has been found as far down as the perineum. In women it frequently is found beneath the skin of the labium.

In etiology the three types of interstitial hernia have much in common. Much of what has been said concerning the cause of properitoneal hernia applies to the subfascial and superficial varieties. The congenital pouches of Rokitansky of course cannot be considered as an etiologic factor. Abnormalities of the testes occur frequently. McCready's Tables show that about 73 per cent. of the cases are associated with arrest of descent or some other abnormal condition of these organs. Moynihan considers retained testis as the most important cause of interstitial hernia. This is accomplished by the testis obstructing the inguinal canal, there barring the descent of the hernia, which in the end causes bulging of the sac in the direction of least resistance. In these cases, as in properitoneal hernia, the use of an improperly fitting truss would appear to be of importance as a factor in developing the diverticulum that forms the interparietal sac.

The diagnosis of interstitial hernia is generally easily made if the anatomic types of hernia are kept in mind. The bulging parietal sac can generally be easily recognized. The frequent association of this form of hernia with anomalies of the testes should direct attention to the possibility of this hernia when imperfect descent of these organs exists. Strangulation of the subfascial and superficial types unlike that of the properitoneal is infrequent.

The treatment of interstitial hernia, including the properitoneal type, can be only operative. The wearing of a truss can do nothing but harm. The presence of a retained testis is always a contraindication to the use of a truss in any hernia. When a parietal sac exists it can only increase the already great risk of strangulation.

REFERENCES.

[1] Soc. Anat., 1849-50.
[2] Arch. f. Klin. Chir., xix, 408.
[3] Beiträge zur klin. Chir., Bd. 13, 1895.
[4] Soc. Anat., 1897.
[5] Lancet, 1900.
[6] Deutsch. Zeitschrift f. klin. Chir., Bd. 69.
[7] Ueber schein reduction bei Hernien u. s. w. verhand. d. Med. Geselsh. zu Leipzig, 1864.
[8] Deutsch. Zeitschrift. f. klin. Chir., Bd. 68, 1903.
[9] Centralbl. f. Chir., 1892.
[10] Mem. d. l. Acad. d. Med. Paris, 1836.
[11] Arch. f. klin., Bd. 34.
[12] Arch. f. klin. Chir., Bd. 4.
[13] Soc. An., 1888.